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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/684,904	10/10/2000	Hironobu Kon	198092US-2S DIV	2551

22850 7590 09/25/2003

OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER

FARAHANI, DANA

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 09/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/684,904

Applicant(s)

KON ET AL.

Examiner

Dana Farahani

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 23-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 23-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 19 July 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 25-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagisawa et al., (U.S. 5,874,750), previously cited further in view of Takeda et al. (1200 V Trench gate NPT-IGBT (IEGT) with Excellent Low On-State Voltage, Proceedings of 1998 International Symposium on Power Semiconductor Devices & lcs, Kyoto, pages 75-79), also previously cited.

Yanagisawa et al. disclose, referring to figures 3, 4 and 5, an injection enhanced gate transistor made of a semiconductor chip, comprising: a collector electrode formed on the back of the chip 10 (see column 4, lines 43-44); a main emitter, 38 of figure 6, formed on an opposing side of the semiconductor chip; high resistance base layer 33; a gate 35 formed on the opposing side on a channel region between the collector and emitter and a gate insulating film 34 between the channel land gate (Fig. 6); a current sense emitter 12a formed on the opposing side of the semiconductor; current sense terminal ES, wherein electrical current from the collector is made to flow to both the main emitter and the current sense emitter (Fig.3); a plate-like collector electrode terminal 18 arranged on the one side of the power semiconductor device and electrically connected to the collector (Fig.4 and column 4, lines 64-65); a plate-like emitter electrode terminal 16 arranged on the one side of the power semiconductor device and

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electrically connected to the emitter (Fig.4, column 4, lines 64-65); wherein the voltage-driven power semiconductor device is a press-contacting type package (see the abstract, lines 1-2).

Yanagisawa et al. does not disclose the gate of the injection enhanced gate transistor being a trench-type gate embedded in the opposing side of the chip, carrier accumulation efficiency of the main emitter and the current sense emitter in On state being greater than that of an insulated gate bipolar transistor (IGBT). However, figure 1 of Takeda et al. shows the gate of the injection enhanced gate transistor being a trench-type gate embedded in the opposing side of the chip, and figures 4 and 5 show carrier accumulation efficiency of the main emitter and the current sense emitter in On-state being greater than that of an insulated gate bipolar transistor in order to offer both sufficient margin for blocking voltage and low on-state voltage Device Design Section, page 75, right column, lines 2-3 form the bottom). It would have been obvious to one having ordinary skill in the art of the time the invention was made to from the gate of the injection enhanced gate transistor being a trench-type gate embedded in the opposing side of the chip and the carrier accumulation efficiency of the main emitter and the current sense emitter in On-state being greater than that of an insulated gate bipolar transistor, as taught by Takeda et al., in the device of Yanagisawa et al., to offer both sufficient margin for blocking voltage and low on-state voltage.

Response to Arguments

3. Applicants' arguments with respect to the rejected claims have been considered but they are not persuasive.

Applicants argue that in figure 47 of the application, the carrier concentration of IEGT has its maximum value at the MOS gate side, while the primary reference lacks such a characteristic. Note that if the primary reference were modified to include the trench gate, as stated in the above rejections, this function inevitably would be in the resulting structure. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Regarding applicants' argument that "[p]age 4 of the outstanding Action attempts to suggest that Yanagisawa IGBT structure can be nevertheless considered to be somehow modified by emitter region doping to achieve some one or another undefined applications of the device", note that in page 4 of the previous Office Action, what was mentioned in the Response to Arguments section was that the modification that results in electron injection efficiency is within the level of ordinary skill in the art. Therefore, the modification is not a conclusory statement, rather it is a modification which one of ordinary skill in the art would have made to make the device usable in a particular application.

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dana Farahani whose telephone number is (703)305-1914. The examiner can normally be reached on M-F 8:00AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703)308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7722 for regular and After Final communications.

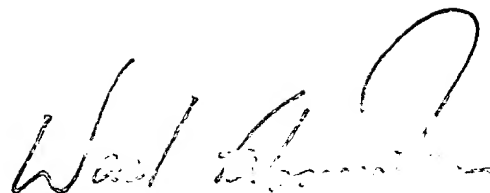
Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

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Dana Farahani
September 16, 2003

A handwritten signature in black ink, appearing to read 'Dana Farahani', is written over a faint, circular embossed seal.

SUPERINTENDENT PRIMARY INVENTOR
TECHNOLOGY CENTER 2000